2010 AARDO Workshop on
Technology on Reducing Post-harvest Losses and
Maintaining Quality of Fruits and Vegetables
186-196

Technology on Reducing Post – harvest losses and Maintaining Quality

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Abstract

The Syrian working paper includes three chapters. The first Chapter contains general information about the Syrian Arab Republic (where the site - the border - the most important cities – population). It also includes the agriculture in Syria (where importance - the distribution of land use - agricultural settlement zones – the important agricultural products, value of agricultural commodities for commercial exchange). The second chapter contains a presentation of post-harvest techniques (Harvest - Pre cooling - Quality Control in the field – Packaging – Transport) and the best practices to be followed to reduce the loss and maintain the quality of fruits and vegetables.

The third Chapter contains the recommendations for marketing chain and post-harvest techniques, these recommendations are at the macro level, at the farm level and the retailer level.

Worksheet also includes many forms and important illustrations in point.

Introduction

1. General Informations about Syrian Arab Republic

Syrian Arab Republic is republic in southwestern Asia continent, bounded on the north by Turkey, on the east by Iraq, on the south by Jordan and on the west by Lebanon and the Mediterranean Sea. Syria is divided into fourteen governorates, these governorates are divided into a total of sixty districts.

The capital Damascus is the largest city in Syria, it is One of the oldest cities in the world, where many of the landmarks and cultural. The most important cities in Syria are:

- Aleppo in northern Syria, the second largest city, it is also a major industrial and cultural center.
- Latakia along with Tartus are Syria's main ports on the Mediterranean sea.
- Homs in central of Syria and Deir -Zor on the Euphrates river in eastern Syria.

The total population of S.A.R. inside the country at the end of 2008 is (19880000).

Fig. 1. Shows the location of Syria in the world.

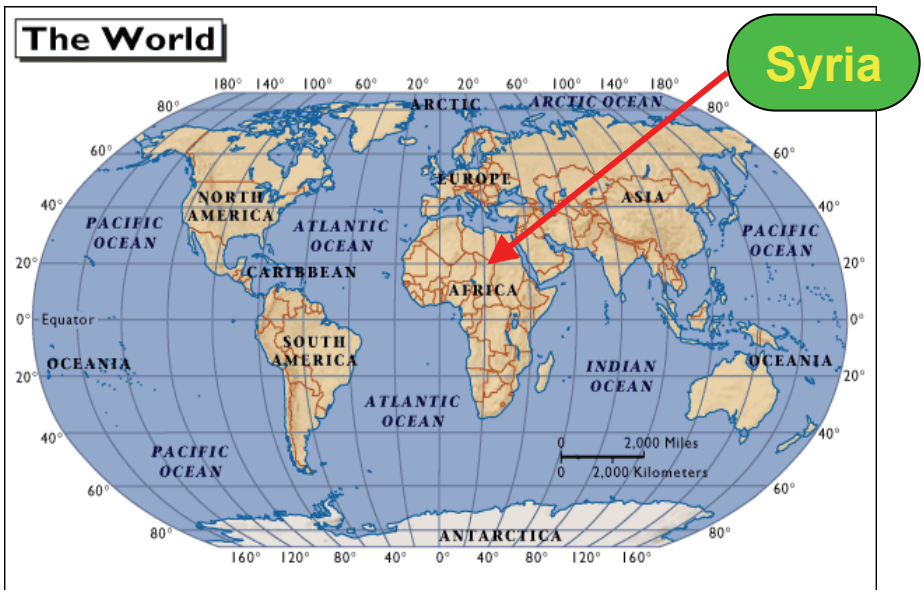


Fig. 1. Syria's position in the world.

And Fig.1. Shows the map of Syria and its borders.

Fig. 2. Map of Syria and its borders.

2. The Agriculture In Syria

A special situation is going to the agricultural sector in Syria within the other economic sectors which compose the national economy, and that is visible because the food is given to citizen regularity, the raw material is available to the industry normaly, the commercial balance is raised and the foreign coinage is available to finance the requirements of others economic sectors. During the past years the Syrian government adopted many structural Adjustment programs; this reflects the increasing growth rate of agricultural export due to increase in agricultural production, specially for the products that have Relative Advantage. The area of Syria is (18517971) ha distributed as in table 1:

Table 1. Land use in Syria for 2008.

Total Area	Cultivable Land	Uncultivable Land	Steppe and Pastures	Forestes
18517971	6023792	3683404	8231974	578801

Fig. 3 shows the land use in Syria for 2008.

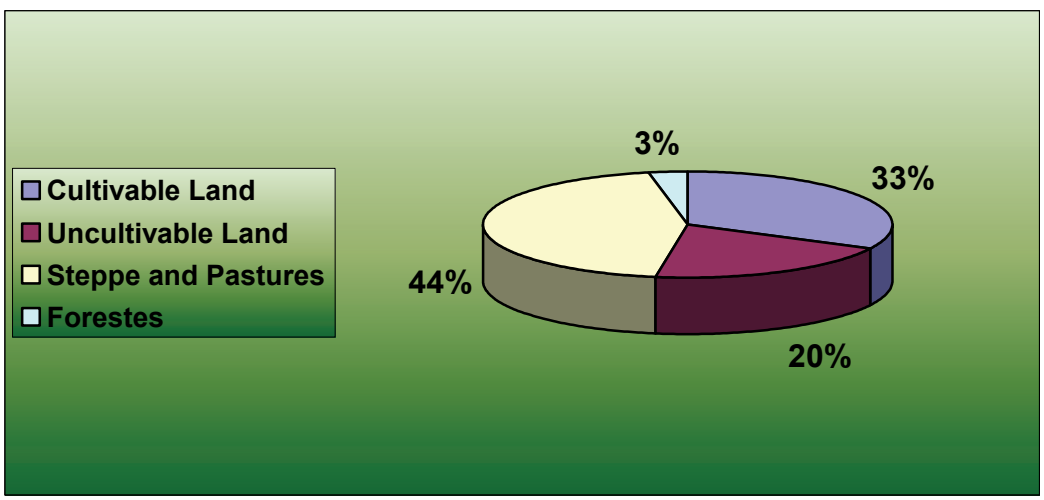


Fig. 3. Land use in Syria for 2008.

Syria is divided into five agricultural settlement zones according to the amount annual rainfall as follows :

First settlement Zone

A zone with annual rainfall over 350 mm, It is divided into two areas:

- The area of annual rainfall rate over 600 mm, Where rain field crops could be successfully planted.

- The area of annual rainfall rate between 350 - 600 mm, and not less than 300 mm, during the 2/3 of the relevant year, it is possible to get two seasons every three years and its main crops are: Wheat, Legumes and Summer Crops, The area of this zone is 2701000 ha, That forms 14.6 % of the country area.

Second settlement Zone

A zone with annual rainfall 250 - 350 mm, and not less than 250 mm. during 2/3 of the relevant year, i.e., it is possible to get two barley seasons each three years, and could be planted beside barley, wheat, legumes and summer crops, the area of this zone is 2475000 ha, that forms 13.3 % of the country area .

Third settlement Zone

A zone with annual rainfall 250 mm, and not less than this figure during the half of the relevant years i.e. it is possible to get one to two Seasons each three years. Its main crops is barley, legumes could be planted, the area of this zone is 1303000 ha, that forms 7.1% the country area.

Fourth settlement Zone (Marginal)

A zone with annual rainfall rate between 200 - 250 mm, not less that 200 mm during the half of the relevant years, lt is good just for barley or for permanent grazing crops, the area of this Zone is 1830000 ha, that forms 9.9% of the country area.

Fifth settlement Zone (Desert and steppe)

This area covers the rest of the country land and it is not suitable for rain field planting, the area of this zone is 10,209,000 ha, that forms 55.1% of the country area.

Fig. 4. Shows distribution of agricultural settlement zones in Syria.

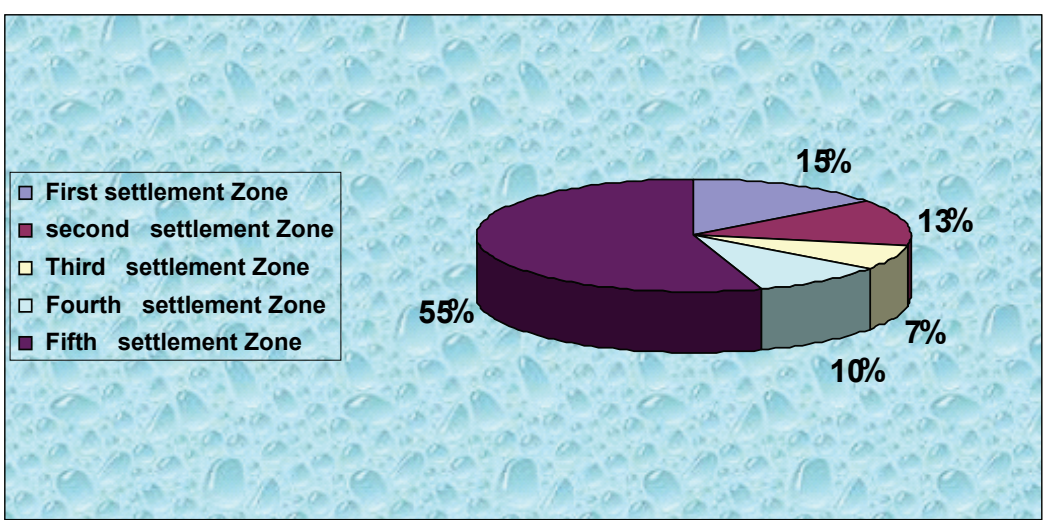


Fig. 4. Distribution of agricultural settlement zones in Syria.

Despite climatic handicaps Syria produces a wide variety of crops, some in sufficient quantity for export. The major crops are cereals, primarily wheat and barley; cotton, grapes, olives, citrus, other fruits such as (Apples, pears, apricots, cherries, peaches, plums, figs, pomegranates, pistachios ..) and vegetables (Potatoes, tomatoes, cucumbers, cabbage, lettuce …) .

The agricultural production value for 2008 by fixed prices amounted / 351511 / million s.p. including / 217068 / million s.p. for plant production value & / 134442 / million s.p. for animal production value. The total value of agricultural commodities for commercial exchange and their percentage to the total exchange of the country in 2007 and 2008 are as in table 2.

Table 2. The total value of agricultural commodities for commercial exchange

Year	2007		2008	
Commercial Exchange	Value/Million s.p	Percentage	Value/Million s.p	Percentage
Import	57442	8.4%	93781	11%
Export	110048	19%	113163	16%

Post - harvest Techniques in Syria and the Mechanism of Improvement

Agricultural sector suffers from many problems that are an obstacle to growth and development, Foremost of these difficulties the problem of agricultural marketing and post – harvest techniques, In addition to technical operations in the field and packing centers and wholesale markets, These Operations include farming practices that must be carried out on farm in order to obtain a good harvest to ensure its ability to compete against a similar product in foreign markets and thus achieve the best profits, These practices begin to determine the appropriate time for harvest and ending with transfer of products to target places, whether the wholesale markets, or sorting and packing centers, or factories, therefore We must know the most important Post - harvest techniques that contribute to maintaining quality of fruit and vegetables.

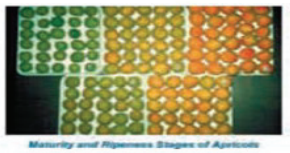
1. Determine the harvest date

Harvest date subjects to many factors including: the specific and clear signs of growth in addition to desires of consumers (size, color and degree of maturity), method of harvest manually or automatically, and nature and type of crop and peak breathing.

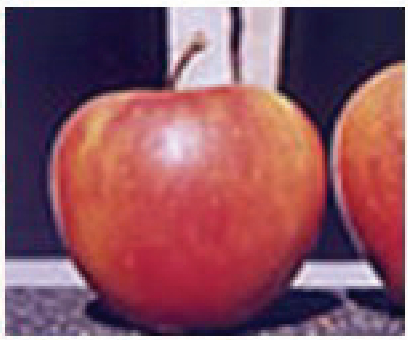
In principle, it is recommended usually harvest in the early hours of day to minimize of temperature field and reduce the costs of cooling units, and should maintain the agricultural products in the shade until they are transferred, It is also recommended to transfer the product as soon as possible.

Photo No. 1 shows stages of maturation in the lemon:

مراحل اكتمال النمو في الليمون



In all cases, harvest date varies by type of fruit. Some farmers pick when the fruitage reach physiological maturity, such as apples, pears and peaches.



Also some crops are picking after their arrival at the final stage of ripening such as strawberries, grapes, cherries, tomatoes, and others.

2. Pre – cooling (Rapid cooling)

Refrigeration is the most important technology to maintain quality of agricultural products, the high temperature is the main reason for deterioration of these products and increase loss.
The most important features of rapid cooling and disposal of temperature field are:

- Reduce of fruit respiration and thus reduce the damage.
- Reduce of transpiration, thus reducing water loss and wilt.
- Reduce of production of ethylene gas and thus delay the maturity and variegated and deterioration of fruit quality.

Note that need for rapid cooling vary from one product to another example:
Grapes - lettuce - strawberries - the flowers should be cooled within a period not more than 3 hours after picking, but Products that are less sensitive to damage such as apples – tomatoes – apricots should be refrigerated within 24 hours.

There are several ways for rapid cooling:

1. Forced air cooling.
2. Hydro cooling.
3. Vacuum cooling.
4. Ice cooling.

3. Quality Control in the field

We must start with application of quality standards for agricultural products in a series of treatments post-harvest and immediately after start with the harvest to reduce mechanical damage or injuries or bruises which are caused by workers, and should also be applied during the collection and mobilization in field. In addition to exclusion of infected fruits and try to initial sort according to color and size, which reduces the effort required in packing centers and reduces costs.

The farmers must use portfolio quality field contains : testing device and measuring the sugar (Refractometer) - device for measuring fruit diameter - Plates for measuring the degree of coloration - A measure of soil acidity - A measure of moisture.

In addition to that the process of mobilization is a very important in series of post-harvest and marketing of vegetables and fruits. It aims to mobilize fruits in boxes of various designs based on crop type, target market.

There are many products that must be mobilized in field because of its sensitivity and to minimize damage during the process of handling , such as grapes and strawberries.
I will show some pictures of mobilization in field and types of boxes:

4. Packaging

The process of packing is the most important stage in series of post - harvest for handling of vegetables and fruits, as the aim of it is contain the fresh product to achieve intact easy unification handling during transport, storage and marketing, in addition to that the correct packing protect the fresh product from mechanical damages which could affect them during handling, such as bruises resulting from the pressure, collision, friction due to vibration.

The packaging system is very effective in promoting and advertising of agricultural products, The systematic boxes that contain slots for ventilation facilitate cooling process of agricultural products.

It is necessary to put labeling on packages include: type, weight or number and country of origin and brand, and in some cases name of farm and exporter.
I will show Some pictures of packages:

62p
36p

don sol
don sol
don sol
Cooperativa de Soses

5. Transport of fresh agricultural products:

Markets of agricultural products and consumption areas are often far from production areas, as well as export markets. This justifies the importance of transport and infrastructure in a series of post-harvest and marketing of agricultural products.

And we must be sure of past practices during transport in terms of packing compaction and temperature control during transport, as well as the movement of air circulation and ventilation.
It should be noted that selection of the optimum means for transport depends on important factors including: value and importance of crop, susceptible to damage, the distance.
There are many methods for transport:

1. Ground transportation in refrigerated trucks.
2. Rail transport.
3. Air transport.

Whatever means of transport we must take into account the following:

1. Protect the product from heat and wind and loss of water content and mechanical damages.
2. Completion of loading and unloading quickly and carefully.
3. Ensure adequate space for ventilation and air circulation.

منظر داخلي لحاوية مبردة — لف حاوية النقل الجوي بمادة عازلة لمنع ارتفاع الحرارة — شاحنة مبردة

المصدر : دليل معاملات ما بعد الحصاد – fao

Recommendations

1. At the macro level:

1. Training farmers for applying post-harvest techniques, and how to comply with the specifications approved in foreign markets.
2. Establishment of companies and associations which are specialized in marketing.
3. Study of foreign markets and target the most important of them.

2. At the farm level:

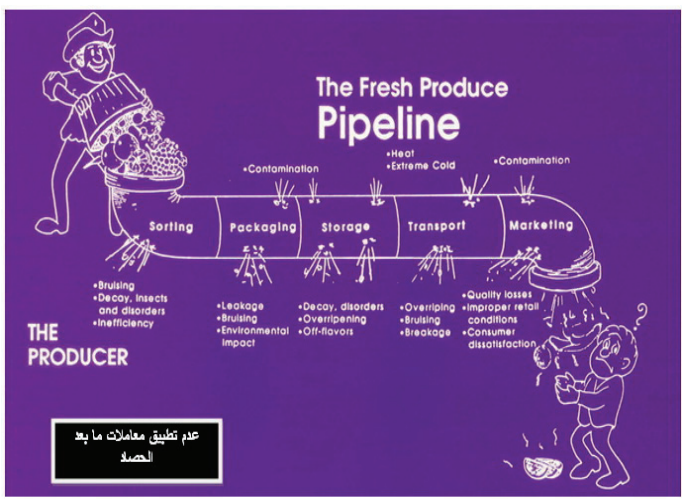
1. Reap the fruits of high quality in appropriate maturity stages, and get rid of unwanted fruits .

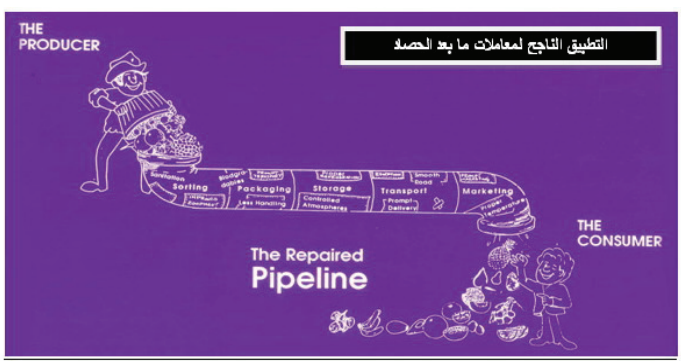
2. Cut through cold hours of day to avoid excess heat.
3. Harvest with technically correct way to reduce of mechanical damage.
4. Mobilization products in a shady spot in field and put the harvested fruits under the shade of trees.
5. Avoid the excess packaging in boxes in order for ventilation.
6. Transport products to market by appropriate chilled means of transport.

3. At the retailer level :

1. Put products in packages of different weights to satisfy desires of consumers.
2. Isolate infected and rotten fruits and get rid of them.

The following painting shows losses and benefits to all dealers in fresh agricultural products, from the producer (farm) passing by sorting, packaging, refrigeration and transport and finally the consumer:





المصدر : VALUE Chains for Fruits - Dr. Errol Hewet - TFNET